

DESCRIPTION**BILLING METHOD FOR
COMMUNICATION NETWORK**

5

Technical Field

The present invention relates to a billing method for a communication network

10 wherein a server device provides information to a plurality of user terminals.

Background Art

Pull-type information transmission is known conventionally in the field of

15 information providing services which use the Internet. In general, pull-type information transmission occurs when a user accesses a server device of an information provider from a communication terminal, such as a personal computer or the like, to download desired information. Additionally, push-type information transmission, wherein information is provided to the user from the server side without awaiting access

20 by a user, has been proposed in recent years.

Communication networks have become more complicated and diversified of late. Accordingly, the forms of networks in which various routers exist between the server device and the user terminal have also increased, such as by interposing a gateway device between the networks with different protocols.

25

Disclosure of the Invention

As the forms of networks diversify as described above, the types of services for information transmission are becoming various, and billing by communication fees or 5 information fees is desired as appropriate to each type of service.

The present invention has been made in consideration of this type of situation, and has the purpose of offering a billing method for an information communication network capable of performing billing suited to the information transmission service type.

10 In order to resolve the above problem, a first aspect of the present invention is a billing method in a communication network including an information provider server device, a plurality of user terminals which receive information from the server device and a transfer device for routing information transmission between the server device and the user terminals; wherein the transfer device comprises:

15 a step of recording billing management information for identifying server devices which are to be subject to IP billing (IP billing means that charges for the information providing services are made not to users but to IP (Information Provider).);

a step of detecting a network address of the server device designated when the 20 user terminal receives an information transmission from the server device;

a step of determining whether or not the server device is to be subject to IP billing based on the detected network address and said billing management information; and

a step of performing a billing procedure with respect to the information 25 provider which performed the information transmission if the server device is determined to be subject to IP billing.

Additionally, in the above-described first aspect of the present invention, the transfer device may be such as to not route an information transmission if it is determined not to be subject to IP billing.

Additionally, a second aspect of the present invention is a billing method in a 5 communication network including an information provider server device, a plurality of user terminals which receive information from the server device and a transfer device for routing information transmission between the server device and the user terminals;

wherein the server device comprises:

10 a step of including billing information which indicates whether or not to use IP billing which is billing with respect to the information provider in the transmission data supplied to the user terminals in response to a request; and

the transfer device comprises:

15 a step of determining whether or not the information transmission is subject to IP billing based on the billing information when routing the exchange of the transmission data; and

a step of performing a billing procedure with respect to the information provider which provided the information transmission if it is determined to be subject to IP billing.

20 Additionally, in either the above-mentioned first or second aspect of the present invention, the transfer device may be such as to perform a billing procedure with respect to users who have received the information transmission if it is determined not to be subject to IP billing.

Additionally, a third aspect of the present invention is a billing method in an information communication network including an information provider server device, a

plurality of user terminals which receive information from the server device and a transfer device for routing information transmission between the server device and the user terminals; wherein the transfer device comprises:

5 a mailbox for mediating push-type information transmission that is subject to

5 IP billing which is billing with respect to the information provider;

and comprises:

a step of storing in the mailbox information mail sent from the server device designating a desired destination and the address of the mailbox;

10 a step of transmitting the information mail stored in the mailbox to user terminals which are the designated destinations; and

a step of performing a billing procedure with respect to the information provider which offered the information transmission with respect to push-type transmission services through the mailbox.

Additionally, a fourth aspect of the present invention is a billing method in a 15 communication network including an information provider server device, a plurality of user terminals which receive information from the server device and a transfer device for routing information transmission between the server device and the user terminals;

wherein said transfer device comprises

20 an IP-billed mailbox for mediating push-type information transmission that is subject to IP billing which is billing with respect to the information provider; and

a user-billed mailbox for mediating information transmission that is not subject to IP billing;

and performs a billing procedure with respect to the information provider which offered the information transmission with respect to push-type information

transmission services through the IP-billed mailbox; and

a step of performing a billing procedure with respect to the user that received the information transmission with respect to information transmission services through the user-billed mailbox.

5 Additionally, in the present invention, the object of the billing may be a communication fee with respect to communication services for the information transmission or may be an information fee with respect to information provided by the information transmission.

10 Additionally, the transfer device may be such as to perform a billing procedure of information fees with respect to users if it is determined as not being subject to IP-billing, and otherwise not perform a billing procedure of information fees.

15 Additionally, in the present invention, the server device may belong to a first communication network following a first communication protocol and the plurality of user terminals belong to a second communication network following a second communication protocol different from that of the first communication network; and the transfer device may be a gateway for converting between the first and second communication protocols and routing information transmissions.

20 Additionally, in the present invention, the second communication network may be a local network accommodating specific user terminals; and the first communication network may be a global network interconnecting information resources such as the server device assigned identification information for identifying an absolute network address.

Additionally, in the present invention, the second communication network may be a mobile communication network accommodating a plurality of user terminals which

are mobile terminals, and the first communication network may be the Internet.

Brief Description of the Drawings

5 Fig. 1 is a block diagram showing the overall structure of an example system according to an embodiment of the present invention.

Fig. 2 is a data format diagram showing the contents of an example subscriber database illustrated in Fig. 1.

10 Fig. 3 is a block diagram showing an example structure of a gateway server illustrated in Fig. 1.

Fig. 4 is a sequence diagram showing an example of the basic operations of pull-type information transmission within the system illustrated in Fig. 1.

Fig. 5 is a sequence diagram showing an example of the basic operations of push-type information transmission within the system illustrated in Fig. 1.

15 Fig. 6 is a conceptual diagram showing a first embodiment of the services according to the push-type information transmission illustrated in Fig. 5.

Fig. 7 is a conceptual diagram showing a second embodiment of the services according to the push-type information transmission illustrated in Fig. 5.

20 Fig. 8 is a flow chart showing an example billing procedure for the case of the pull-type information transmission illustrated in Fig. 4.

Fig. 9 is a flow chart showing an example billing procedure for the case of the push-type information transmission illustrated in Fig. 5.

Fig. 10 is a screen transition diagram for explaining a variant of the present invention.

Best Modes for Carrying Out the Invention

Hereinafter, an embodiment of the present invention shall be explained with reference to the drawings. This embodiment is structured as a system wherein the 5 present invention is applied to a mobile packet communication network. The present invention is not restricted to the following embodiment, and various modifications are possible within the range of the technical concept thereof.

- A: Structure of Embodiment
- 10 (1) Overall Structure of System

Fig. 1 is a block diagram showing an embodiment of the present invention. In the drawing, MS denotes a mobile station which receives packet communication services from a mobile packet communication network MPN. Mobile station MS is connected to the mobile packet communication network MPN shown in 15 the drawing. Mobile station MS is also connected to a mobile telephone network which is not shown, and is therefore capable of receiving mobile telephone services as well. The mobile station MS comprises a voice input-output portion for a user to perform voice communications, a radio portion for performing radio communications with a base station BS, an information display portion comprising a liquid crystal panel 20 or the like, an operating portion to perform information input operations, such as number input and character input, and an internal microcomputer for controlling these parts. The mobile station MS also has software (i.e., a browser) for browsing HTML (Hyper Text Markup Language) document data (hereinafter referred to as HTML data). The software is also for displaying an interactive screen for the user based on HTML 25 data supplied from an information provider (hereinafter abbreviated to IP) via a mobile

packet communication network.

Additionally, the mobile packet communication network MPN comprises a base station BS, a packet processing module PS, a gateway server GWS, a subscriber database UDB, a billing system BILL and a communication line for connecting these 5 elements.

The base stations BS are positioned at predetermined intervals obtained by dividing the ground into ranges of, for example, a radius of 500 m, and perform radio communications with mobile stations MS visiting the radio zones formed thereby.

The packet processing module PS is a computer system in a packet switching 10 center accommodating a plurality of base stations BS. The packet processing module PS receives packet switching requests from the mobile stations MS (packet switching service registration is explained below), and performs the switching of packets in the mobile packet communication network MPN.

The gateway server GWS is a computer system provided in a mobile packet 15 gateway switching center for interconnecting the mobile packet communication network MPN with other networks such as the Internet INET. The gateway server GWS converts communication protocols which differ between the networks. Specifically, the gateway server GWS makes conversions between the transmission protocol for mobile packet communications networks used by the mobile packet communication 20 network MPN and the TCP/IP used in other networks such as the Internet INET.

Additionally, the gateway server GWS works in cooperation with the IP server W, the subscriber database UDB and the billing system BILL to control various applications, such as information providing services and billing procedures for information transmission.

The subscriber database UDB stores a subscriber registration information file.

The subscriber registration information file is composed of information relating to subscribers of the mobile packet communication network MPN and an IP registration information file composed of registration information of the IP. Fig. 2 is a data format diagram showing an example of the content of this subscriber database UDB. As shown in the drawing, the subscriber registration information file contains attribute data indicating the attributes of each subscriber, such as the telephone number of the mobile station MS, name, sex, birthdate and address for each subscriber (i.e., the user of the mobile station MS) in the mobile packet communication network MPN. Additionally, the IP registration information file contains the company name and the absolute address on the network. For example, in the case of the Internet, the absolute address on the network is the URL (Uniform Resource Locator) which specifies the information resources on the WWW (World Wide Web); hereinafter, the absolute network address in the present embodiment shall be referred to as the URL). The IP registration information file also contains information indicating whether the type of billing is IP billing or not (e.g., IP billing or user billing), and information indicating whether the type of billing depends on the amount or is fixed-rate, for each IP which contracts to receive gateway services with the company which runs the mobile packet communication network MPN. Here, IP billing refers to billing for information transmissions service which is performed, not billing the user who received the transmission service, but billing the IP. On the other hand, billing the user shall hereinafter be referred to as user billing.

The billing system BILL calculates the fees for providing services, based on service history information supplied from the gateway server, and issues a bill to the

user or the IP. Billing types include user billing, IP billing, amount-dependent, and fixed-rate. The billing system BILL performs billing in accordance with each billing type.

The IP server W is a server system run by the IP, which sends information to 5 the users over a network in an HTML data format. The IP server W can be connected to the gateway server GWS via an exclusive line or the Internet INET, as shown in Fig.

1. As shown in Fig. 3, the IP server W can also be inside the gateway server GWS which is provided by the owner of the mobile packet communication network MPN (hereafter referred to as an IP server W-MAX).

10 (2) Structure of Gateway Server

Next, the structure of the gateway server GWS shall be explained. Fig. 3 is a block diagram showing the structure of a gateway server GWS. In the drawing, the gateway server GWS comprises a system control portion I-MAX, a user information managing portion U-MAX, a billing managing portion P-MAX, an electronic mail managing portion M-MAX, an IP server W-MAX and a bus BUS for connecting these 15 portions.

The system control portion I-MAX controls the various portions of the gateway server GWS, and functions as an interface between networks. For example, the system control portion I-MAX may perform protocol conversion between the mobile packet communication network MPN and other networks such as the Internet INET.

The user information managing portion U-MAX stores and manages subscriber registration information and IP registration information obtained by referencing the subscriber database UDB, the correspondence between telephone numbers of the mobile stations and user management numbers (to be explained below) and the access histories

of users to the IP server W (for example, the number of accesses to each IP server).

Additionally, the user information managing portion U-MAX converts between the telephone numbers and user management number, collates telephone numbers and compares attribute data based on the above stored information.

5 The billing managing portion P-MAX records and manages information necessary for billing with respect to the information transmission services, and supplies this information to the billing system BILL. Specifically, it stores the fact that an electronic mail has been received from the IP server W as history information, calculates the number of packets to be exchanged when transmitting the electronic mail 10 to the user, and stores this calculated value. Additionally, the billing managing portion P-MAX references the content of the subscriber database UDB transferred to the user information managing portion U-MAX, in order to determine whether or not the billing type for each IP is IP billing, and whether or not it is amount-dependent. The P-MAX then requests billing to the billing system BILL based on the billing type.

15 The electronic mail managing portion M-MAX mediates the exchange of electronic mail between mobile station MS users, between mobile station MS users and users of other networks such as the Internet INET, or between mobile station MS users and the IP server W. This electronic mail managing portion M-MAX includes mailboxes for storing the electronic mails to be transferred for each user or for each IP 20 server W. There are three types of mailboxes in accordance with the type of mail service, with the mailboxes being distinguished by their addresses (mail addresses).

- (i) A first mailbox BOX1 is a conventional mailbox, wherein the electronic mail transferred between users is stored at mail addresses assigned for each user.
- (ii) A second mailbox BOX2 is a mailbox for storing electronic mail transmitted from

the IP to specific users in order to provide information or the like. Here, a specific user is a user who has already completed registration procedures with respect to the IP. This second mailbox BOX2 is used in a first type of service for push-type information transmission, described below.

5 (iii) A third mailbox BOX3, similar to the second mailbox BOX2, is a mailbox for storing electronic mail transmitted from the IP to a user in order to provide information. It differs from the second mailbox BOX2 in that, instead of storing electronic mail provided to users which have been pre-registered in the IP, it stores electronic mail provided to users having attributes (attributes such as sex, age, address, etc.) designated 10 by the IP. This third mailbox BOX3 is used in a second type of service for push-type information transmission, described below.

The IP server W-MAX is a server system provided by the company owning the mobile packet communication network MPN. This IP server W-MAX, like the other IP server W, performs services such as providing information to the users.

15

B. Operations of the Embodiment

Next, operations of the embodiment having the above-described structure shall be explained.

First, information transmission shall be explained, followed by an explanation 20 of the billing procedures.

B-1. Information Transmission

With regard to the information transmission according to the present embodiment, there is pull-type information transmission in which the user of a mobile station MS receives information transmissions by accessing the IP server W, and

push-type information transmission in which information transmission is performed from the IP server W side to specified or non-specified users without waiting for user access. Hereinafter, the explanation shall be given separately for these types.

(1) Pull-type Information Transmission

5 Fig. 4 is a sequence showing a basic operation for pull-type information transmission.

As shown in the drawing, the mobile station MS performs a packet switching service registration in cooperation with the packet processing module PS (step S1). The packet switching service registration is a preliminary registration procedure for 10 enabling packet switching in a mobile packet communication network MPN. When this packet switching service registration is completed, the mobile station MS sends a line connection request signal to the mobile packet communication network MPN (step S2). The line connection request signal is sent through the packet processing module PS to the gateway server GWS (step S3). If a line connection is possible, then the 15 gateway server GWS sends a line connection response signal through the packet processing module PS back to the mobile station MS (steps S4, S5). As a result, packet switching is enabled between the mobile station MS and the gateway server GWS.

Next, the mobile station MS sends a connection request signal designating the 20 URL of a desired IP server W (step S6). This connection request signal is routed through the packet processing module PS and sent to the gateway server GWS (step S7). The gateway server GWS receives the connection request signal, and establishes a link with the IP server W of the designated URL (step S8).

When a link has been established with the gateway server GWS in this way, the

IP server W sends HTML data which has been prepared beforehand to the mobile station MS (step S9). This HTML data is routed through the gateway server GWS and transferred to the packet processing module PS (step S10). Furthermore, the HTML data received at the packet processing module PS is transferred to the mobile station MS 5 (step S11).

The operations of the above steps S6-S11 are repeatedly performed in accordance with the amount of data to be transmitted from the IP server W to the mobile station MS. The mobile station MS interprets the sequentially transmitted HTML data by means of the browser and displays the received information at the information 10 display portion.

When the data transmission to the mobile station MS has been completed, the mobile station MS sends an acknowledgement signal (step S12). The packet processing module PS transfers this acknowledgement signal to the gateway server GWS as a data delivery notification (step S13). When the IP server W completes the 15 data transmission to the mobile station MS, the link between the gateway server GWS and the IP server W is released (step S14).

Additionally, when there is a data delivery notification from the mobile station MS to the gateway server GWS, the gateway server GWS performs a billing procedure for the information transmission. The billing procedure performed at this time shall be 20 described in detail below.

(2) Push-type Information Transmission

First, the basic operations of the push-type information transmission shall be explained, followed by explanations of two types of services that involve push-type information transmission.

(i) Basic Operations of Push-type Information Transmission

Fig. 5 is a sequence diagram illustrating the basic operations of push-type information transmission.

In the drawing, an IP server W first sends information to be provided to users 5 to the gateway server GWS in the form of electronic mail (step S21). When the gateway server GWS receives the electronic mail, it stores the electronic mail in the designated mailbox and sends a communication start notification signal to the packet processing module PS (step S22). This communication start notification signal includes information designating the destination address of the electronic mail. When 10 the packet processing module PS receives this communication start notification signal, it calls the mobile station MS corresponding to the destination address included in the signal (step S23).

When the user of the mobile station MS performs a specified operation on the mobile station MS in response to the call, the same sequence as previously described 15 with reference to steps S1-S5 (shown in Fig. 4) is performed. The mobile station enters a state of being capable of packet switching with the gateway server GWS (steps S24-S28). Next, the gateway server GWS sends a reception notification signal, including the address information of the mailbox in which the electronic mail is stored, to the packet processing module PS (step S29). Furthermore, the packet processing 20 module PS sends the received reception notification signal to the mobile station MS (step S30).

Upon receiving the reception notification signal, the mobile station MS sends a connection request signal designating the address of the mailbox included in the reception notification signal to the packet processing module PS (step S31). This

connection request signal is transferred through the packet processing module PS to the gateway server GWS (step S32). Upon receiving the connection request signal, the gateway server GWS sends a connection acknowledgement signal to the packet processing module PS (step S33). The packet processing module PS sends the 5 received connection acknowledgement signal to the mobile station MS (step S34).

Next, the gateway server GWS reads the electronic mail received from the IP server W from the mailbox whose address is designated in the connection request signal, and transfers the electronic mail to the packet processing module PS (step S35). Upon receiving the electronic mail, the packet processing module PS sends this mail to the 10 mobile station MS which issued the connection request (step S36).

The operations of the above steps S31-S36 are repeatedly performed in accordance with the amount of data in the electronic mail to be transmitted from the IP server W to the mobile station MS.

When the mobile station MS has received the electronic mail in this way, a 15 delivery notification is sent to the gateway server GWS in the same manner as in steps S12 and S13 shown in Fig. 4 (steps S37, S38), and the push-type information transmission is completed.

Additionally, if there is a data delivery notification from the mobile station MS to the gateway server GWS, then the gateway server GWS performs a billing procedure 20 for the information transmission. The billing procedure performed at this time shall be described in detail below.

(ii) First Type of Service involving Push-type Information Transmission

In the present embodiment, there are two types of services involving push-type information transmission.

The first type is a service of transmitting electronic mail from the IP server for the purpose of providing certain information to users who have completed a registration procedure with the IP beforehand. The electronic mail is stored in the second mailbox BOX2, and the electronic mail is transmitted in response to a user request after the user 5 has been called.

Fig. 6 is a conceptual diagram for explaining the first type. In this drawing, a user who desires services, such as information provided by a specific IP, operates a mobile station MS to access the network, and performs preliminary registration procedures with respect to the IP server (step S61). With this access, the subscriber 10 number of the user (i.e., the telephone number of the mobile station MS) is transferred to the gateway server GWS. The gateway server GWS converts the received subscriber number into a user management number, which is user identity information having a one-to-one correspondence with the telephone number in the user information managing portion U-MAX. The user management number is used to avoid the 15 telephone number from being sent outside the packet communication network MPN. This user management number is sent from the gateway server GWS to the IP server W, and is stored in the IP server W as user registration information (step S62).

Then, if the IP server W has information to be provided to a registered user, the IP server W arranges the information as transmission data in the form of electronic mail, 20 appends to the electronic mail the address of the second mailbox BOX2 and the user management number of the registered user to which the information is to be provided, and sends the mail to the gateway server GWS (step S63).

When the gateway server GWS receives the electronic mail from the IP server W, it stores the mail in the second mailbox BOX2 of the electronic mail managing

portion M-MAX, converts the designated user management number to the corresponding telephone number in the user information managing portion U-MAX, and calls the mobile station MS of that telephone number (step S64).

If the user of the mobile station MS who has received this call desires to

5 receive the information provided by the IP server, the user operates the mobile station MS to access the gateway server GWS and requests a download of the electronic mail (step S65). The download request signal sent to the gateway server GWS at this time contains the telephone number of the mobile station MS that is the source of the request. The gateway server GWS compares the telephone number of the mobile station MS

10 from which the request signal originated with the telephone number corresponding to the user management number designated by the IP server W at the time of reception of the electronic mail in the user information managing portion U-MAX. Based on the comparison, the gateway server GWS determines whether or not to permit access to the second mailbox BOX2, and thereafter reads the electronic mail from the mailbox BOX2

15 and sends it to the mobile station MS (steps S66, S67).

In this way, it is possible to provide information to specific users registered with the IP server W.

(iii) Second Type of Service involving Push-type Information Transmission

The second type is a service whereby electronic mail, sent from the IP server

20 for the purposes of providing information to users having attributes (attributes such as sex, age and address) designated by the IP server, is stored in a third mailbox BOX3. The electronic mail is transmitted to relevant users in response to user requests after the relevant users have been called.

Fig. 7 is a conceptual diagram for explaining the second type. In the drawing,

users who are prepared to receive services such as information provided from an unspecified IP operate the mobile station MS to access the network, and perform preliminary registration procedures with respect to the gateway server GWS (step S71).

With this access, the telephone number of the mobile station MS is transferred to the

5 gateway server GWS. The telephone number is stored in the user information managing portion U-MAX of the gateway server GWS as user registration information.

Then, if the IP server W has information to provide to users, the IP server W arranges the information in electronic mail form, appends attribute data, such as sex, age and address for specifying the user, to the electronic mail, and sends the mail to the 10 gateway server GWS (step S72).

When the gateway server GWS receives the electronic mail containing the attribute data from the IP server W, it stores the electronic mail in the third mailbox BOX3. The user information managing portion U-MAX compares the attribute data appended to the electronic mail with the attribute data of each user registered in the

15 subscriber database UDB in order to specify relevant users. For example, if the attributes designated by the IP server W are "men in their thirties who live in Tokyo", then a search is made for relevant users having these attributes from among the users registered in the subscriber database UDB, and the telephone number of those users are extracted. The gateway server GWS calls the mobile stations MS of the telephone 20 numbers extracted in this way (step S73).

If the user of a mobile station MS called by the gateway server GWS wishes to receive the information provided by the IP server, the user operates the mobile station MS to access the gateway server GWS, and requests a download of electronic mail (step S74). At this time, the telephone number of the mobile station MS, which is the source

of the request, is appended to the download request signal sent to the gateway server GWS. The gateway server GWS, in the user information managing portion U-MAX, compares the telephone number of the mobile station MS which originated the request signal with the telephone numbers of users who have completed the above-described 5 registration procedure in order to determine whether or not to permit access to the third mailbox BOX3. After which, the gateway server GWS reads the electronic mail from the third mailbox BOX3 and sends it to the mobile station MS which made the request (steps S75, S76).

In this way, it is possible for the IP server W to perform an information 10 providing service. The service is provided to users who desire the provision of information from unspecified IP server W.

B-2: Billing Procedure

While types of billing include communication fee billing for communication services and information fee billing for information providing services of IP's, 15 communication fee billing shall be explained as an example in the present embodiment.

Additionally, the billing procedures for the present invention include user billing for users who have received information and IP billing for billing the IP's who have provided the information. In the present embodiment, whether to perform user billing or IP billing is managed by different methods for the case of pull-type 20 information transmission and push-type information transmission. Both cases shall be explained below.

(1) Pull-type Information Transmission

Generally, in the case of pull-type information transmission, the information is provided in accordance with a request from the user. Thus, user billing is more readily

applicable. However, IP billing is more readily applicable in cases where the IP wishes to provide information free in response to requests from unspecified users for the purposes of advertisement or the like. Therefore, in the present embodiment, in the case of pull-type information transmission, user billing is principally applied. In 5 exceptional cases where the IP is billed, the IP is pre-registered in the subscriber database UDB. Then, the gateway server GWS extracts from the subscriber database UDB a list of URL's of IP servers W to which IP billing is applied, and stores it in a memory in the billing managing portion P-MAX as an IP-billing list table.

Fig. 8 is a flow chart showing the billing procedure for pull-type information 10 transmission. In this drawing, the user first operates the mobile station MS to access a designated IP server W. Upon receiving a delivery acknowledgement signal from the user, the gateway server GWS checks whether or not the URL of the IP server W accessed by the user corresponds to an IP to be IP billed, as listed in the IP-billing list table (step S101).

15 If it is not an IP sever to be IP-billed, then user billing is applied. In this case, the billing managing portion P-MAX of the gateway GWS sends a user management number of the user who received the information transmission and the number of received packets to the billing system BILL (step S102). The billing system BILL calculates a communication fee by multiplying the number of packets supplied from the 20 gateway server GWS by a unit price, and issues a bill to the user specified by the user management number (step S103).

On the other hand, if the URL of the IP server W accessed by the user corresponds to an IP to be IP-billed, then IP billing is applied. In this case, the billing managing portion P-MAX of the gateway server GWS sends the sum of the received

packets and the URL of the IP server W which was accessed to the billing system BILL (step S104). The billing system BILL calculates the communication fee by multiplying the number of packets supplied from the gateway server GWS by a unit price, and issues a bill to the IP (step S105).

5 (2) Push-type Information Transmission

Fig. 9 is a flow chart showing a billing procedure for the case of push-type information transmission. In the drawing, when the gateway server GWS receives electronic mail from the IP server W in the second mailbox BOX2 or the third mailbox BOX3, it recognizes that there has been an order for push-type information transmission, 10 and decides to apply IP billing (step S201). That is, in the case of push-type information transmission, IP billing is more readily applicable to this type of information transmission, so that in the present embodiment, IP billing is always applied.

Next, the gateway server GWS specifies the user to receive the information as 15 described above, and then calls the mobile station MS to transmit the electronic mail received from the IP server to the mobile station MS. In the case of IP billing, user billing is not performed with respect to this transmission, and the IP is billed for everything.

In this case, the billing managing portion P-MAX of the gateway server GWS 20 references the IP registration information stored in the subscriber database UDB, and checks whether the type of billing to be applied to the IP server W is amount-dependent or fixed-rate (step S202).

If the billing type is amount-dependent, the billing managing portion P-MAX of the gateway server GWS sends the sum of the packets exchanged in the transmission

of electronic mail and the URL of the IP server W which was the source of the electronic mail to the billing system BILL (step S203). The billing system BILL multiplies the number of the packets supplied from the gateway server GWS by a unit price to calculate the communication fee, and issues a bill to the IP (step S204).

5 On the other hand, if the billing type is fixed-rate, then the billing managing portion P-MAX of the gateway server GWS sends the URL of the IP server W to the billing system BILL when the electronic mail is received from the IP server, so as to the IP (step S205). The billing system BILL receives the URL and issues a bill of a standard amount to the indicated IP (step S206).

10 If the fixed-rate billing format is one where billing is applied to a standard period of time, such as monthly, the IP is billed whether or not the electronic mail from the IP server W reaches the gateway server GWS. Therefore, in this case, there is no cooperation between the gateway server GWS and the billing system BILL, and the billing system BILL independently issues a bill to the IP at regular periods.

15

C: Modification Examples

As previously mentioned, the present invention is not restricted to the above-described embodiments. The present invention can have various modifications within the range of the technical concept of the present invention, for example the 20 following.

(1) In the embodiments, information is provided to mobile stations MS belonging to a mobile packet communication network MPN from another network such as the Internet INET (first communication network). If for example there exists a global network other than the Internet INET, then the present invention is applicable to cases

wherein information is provided from such a network to a mobile station MS belonging to a mobile packet communication network MPN. In this case, the information resource of the IP server W can be specified by means of an absolute address defined in the global network to which it is applied, instead of by a URL.

5 Additionally, the network (second communication network) to which the user terminal belongs is not restricted to being a mobile packet communication network MPN. The invention is applicable for providing information to user terminals belonging to local networks such as a fixed network which includes stationary terminals.

10 Furthermore, the present invention is not restricted to packet switching networks, and is applicable to data communication networks which perform other types of data communications. The communication protocols indicated in the embodiments represent only one possible example. Additionally, the form of the data transmitted from the IP server is not restricted to HTML format, and other formats may be 15 employed. For example, if the transmitted information is only text data, then it is of course not necessary to employ a data format such as HTML which can handle multimedia.

(2) In the embodiments, the communication fee billing for pull-type information transmission was uniformly made amount-dependent, but the present invention is not 20 limited thereto. It is possible to register information indicating whether the billing is amount-dependent or fixed-rate in the subscriber database UDB, as in the case of push-type information transmission, and to perform billing procedures in accordance with the type of billing. Where a fixed-rate system is employed for pull-type information transmission, the user or IP is billed a standard amount regardless of the

number of exchanged packets, as in the case of push-type information transmission.

Additionally, while the billing type was set for each IP in the IP registration file of the subscriber database UDB in the embodiments, the present invention is not restricted thereto. It is possible to set the billing type for each user in the subscriber 5 registration file. Additionally, when wishing to set the billing type according to the IP and the user, the billing type for each user can be set for each IP in the IP registration information file. Alternatively, the billing type for each IP can be set for each user in the subscriber registration information file.

(3) While only communication fee billing was explained in the embodiments for 10 the purpose of simplicity, the present invention can be similarly applied to information fee billing. When employing amount-dependent information fee billing, billing does not depend on the number of exchanged packets as in communication fee billing. Instead, it is possible to apply various billing types such as for example, billing in accordance with the number of exchanged electronic mails or when wishing to change 15 the amount depending on the case, appending amount information concerning an electronic mail transmission to the electronic mail sent from the IP server W to the gateway server GWS.

Additionally, in the case of information fee billing, it is possible to perform 20 only user billing and not to perform IP billing. In this case, all of the billing types in the IP registration information file in the subscriber database UDB can be set to user billing or the billing procedure can be disabled with respect to IP's which are set for IP billing.

(4) In the embodiments, the billing type in pull-type information transmission was decided by the gateway server GWS having a list table of IP-billing and referencing the

table, but the present invention is not restricted thereto. It is possible, for example, to append information indicating IP billing or not by adding a tag to the HTML data sent from the IP server W. The gateway server GWS may then decide the billing type based on this information.

5 (5) The structure of the network in the embodiments is one possible example, and the present invention is not restricted to such a structure. For example, it is possible to divide up the functions among a plurality of nodes, such as by dividing nodes having a communication protocol converting function and nodes having other functions.

10 (6) In the embodiments, the IP server W manages user registration information with respect to the IP's in a first type of service by means of push-type information transmission. Alternatively, the gateway server GWS may handle the management of user registration information. For example, as shown in Fig. 10, a sequence of dialog screens (1-5) may be displayed when a user performs registration procedures with the IP. A dialog screen (hereafter referred to as a registration screen) for aiding in the 15 registration operation may be sent as HTML data prepared by the gateway server GWS to the mobile station MS of the user for display. The user registration information may then be stored and managed at the gateway server GWS based on the user registration procedures. In this case, it is possible for the gateway server GWS to determine with which IP server W the user has performed registration procedures. The determination 20 may be based on the address information such as the URL designated when the user accesses the IP server W. The gateway server GWS may therefore provide a registration screen of HTML data for any of a plurality of IP servers W based on the address information such as the URL. The HTML data to be sent to the mobile station MS of the user as a registration screen may also be specified based on the address

information, such as the URL designated by the user.

(7) While in the embodiments, in the case of push-type information transmission, the user of a mobile station MS who has received a call for electronic mail operates the mobile station MS to access the gateway server GWS and download the electronic mail.

5 The present invention is not restricted thereto. It is possible that when the mobile station MS receives a call, it automatically accesses the gateway server GWS and downloads the electronic mail without waiting for the instruction operations of the user.

(8) In the embodiments, IP billing is always used for push-type information transmission, but the present invention is not restricted thereto. User billing can also 10 be applied in the case of push-type information transmission. In this case, as with the pull-type information transmission described above, an IP billing list table should be made based on the set contents of a subscriber database UDB and should be referenced in order to determine whether to use IP billing or user billing. In the case of user billing, the procedures appropriate for user billing should be followed.

15 Additionally, even in the case of exclusively billing the IP, it is possible to prepare an IP billing list table for having a list of relevant IP servers to be IP-billed, so that when there is a request for push-type information transmission from an IP server not listed in IP billing list table. The IP billing list table may then be used so that the information transmission will not be routed, such as by disposing of the sent electronic 20 mail.